

wings are similar to the ♂. The apical patch is cut more square than the ♂, with two small yellow apical spots; ground-colour light yellow. Lower wing: ground-colour deep yellow, showing the black of reverse side through, giving it a bluish appearance.

Underside of hind wing: the large round central spot deep yellow, the abdominal fold dotted with yellow.

- D. bothwelli*, ♀ (Pl. VI. fig. 6).—Similar to the ♂; the black of fore wing encircles the white slightly more than in the ♂, two yellow spots at the apex. Lower wing: ground-colour cream; black border from the top shading off to the middle, from there to the anal angle dusky blue, showing the underside red, streak through. Underside of lower wing light yellow; abdominal fold deep yellow, very like the ♂♂.
- D. jordani*, ♀ (Pl. VI. fig. 7).—Closely resembles the ♂, but the black apical patch is slightly larger and more defined than in the ♂. Lower wings cream with black margin, slightly wider than the ♂, and all the reverse markings showing through; three dull apical yellow spots. Underside of fore wing the same as in the ♂; underside only differs in the ♀ by the black spur in the middle of wing being shorter, leaving a more defined white discal band.

EXPLANATION OF PLATE VI.

- Fig. 1. Delias heroni*, var. *albo-oculatus*, ♂.
Fig. 2. " " caroli, ab. *flava*, ♂.
Fig. 3. " " heroni, ♀.
Fig. 4. " " dixeyi, ♀.
Fig. 5. " " bothwelli, ♀.
Fig. 6. " " jordani, ♀.

III.—Notes on *Fossorial Hymenoptera*.—XV.

By ROWLAND E. TURNER, F.Z.S., F.E.S.

New Australian Crabronidæ.

THE material for the present paper was partly collected by myself on a recent expedition to Tasmania and Australia. I am also indebted to Dr. Hamlyn-Harris, of the Queensland Museum, and Mr. Lea, of the South-Australian Museum, for the supply of specimens, several of which have proved to be novelties.

Key to the Australian Genera of the Ampuliciniæ.

- Front produced into a lamella projecting between the antennæ; second and third cubital cells each receiving a recurrent nerve; cubitus of the hind wing originating before the transverse median nerve *Dolichurus*, Ltr.
- Front without a lamella; first and third cubital cells each receiving a recurrent nerve, sometimes the second recurrent interstitial with the second transverse cubital nerve; cubitus of hind wing interstitial with the transverse median nerve *Aphelotoma*, Westw.

Dolichurus carbonarius, Sm.

Dolichurus carbonarius, Sm. Trans. Ent. Soc. London, p. 303 (1869). ♀.

Hab. Champion Bay, W.A. (*du Boulay*); Mackay, Q. (*Turner*); January. Kuranda, Q. (*Turner*); May to July.

This seems to be the only Australian species of the genus. I took it in considerable numbers at Kuranda in 1913; the males, which were much the commonest, running on foliage, the females most often in loose bark at the foot of large trees.

Key to the Species of *Aphelotoma*.

♀ ♀.

1. Legs wholly bright ferruginous *A. tasmanica*, Westw.
Legs black, sometimes partly fusco-ferruginous 2.
2. Second recurrent nerve received by the third cubital cell 3.
Second recurrent nerve interstitial with the second transverse cubital nerve 4.
3. Clypeus and antennæ black *A. striaticollis*, Turn.
Clypeus and six basal joints of antennæ pale ferruginous *A. affinis*, Turn.
4. Pronotum rugose; dorsal segments 3-5 covered with short golden pubescence *A. auriventris*, Turn.
Pronotum almost smooth, opaque; dorsal segments shining, without conspicuous pubescence *A. aterrima*, Turn.

♂ ♂.

1. Abdomen bright ferruginous red *A. rufiventris*, Turn.
Abdomen black, sometimes with bronze sheen. 2.
2. Pronotum rugose, with a small spine on each side at the anterior angles 3.
Pronotum almost smooth, without a spine at the anterior angles *A. aterrima*, Turn.
3. Femora black; third dorsal segment covered with golden pubescence *A. auriventris*, Turn.
Femora bright ferruginous; third dorsal segment without pubescence *A. tasmanica*, Westw.

Aphelotoma tasmanica, Westw.

Aphelotoma tasmanica, Westw. Trans. Ent. Soc. Lond., Journ. of Proc. p. 13 (1840). ♀.

Hab. Tasman's Arch; February. Eaglehawk Neck; March. Victoria.

Taken running on dead *Eucalyptus*-logs in which old beetle-holes were numerous. Although of considerably smaller size, this wasp bears a considerable resemblance to ants of the genus *Myrmecia*, especially *M. esuriens*, Fabr., and another species with red legs, *Myrmecia pilosula*, Sm. When alarmed the wasp often picks up a fragment of dead stick or leaf, which it carries in its mandibles, thus increasing the resemblance to the ant. *Aphelotoma auriventris*, Turn., a species with a wide range in the southern half of Australia, also bears a considerable likeness to *Myrmecia mandibularis*, Sm., though the difference in size is very great; I have never seen this species or any of the Queensland species of *Aphelotoma* carrying anything in their mandibles. The Tasmanian species is considerably larger than any other of the genus.

I have not seen males from Tasmania or females from Victoria, and it is possible that the Victorian males belong to a different species, the pronotum being more coarsely rugose and the first recurrent nervure interstitial with the first transverse cubital nervure.

Aphelotoma auriventris, Turn.

Aphelotoma auriventris, Turn. Ann. & Mag. Nat. Hist. (7) xix. p. 269 (1907).

Hab. Grampian Hills, Victoria; Kangaroo Island, S.A.; Yallingup, S.W. Australia.

Aphelotoma affinis, Turn.

Aphelotoma affinis, Turn. Proc. Zool. Soc. London, p. 341 (1910). ♀.

This is nearer to *striaticollis* than to any other species, but may be distinguished by the colour of the clypeus and antennæ and by the somewhat finer sculpture of the pronotum and median segment. It is possible that it may prove to be a variety of that species.

Subfamily *SPIECINÆ*.*Chlorion (Proterosphex) rhodosoma*, sp. n.

♀. Rufo-ferruginea; capite nigro, argenteo-piloso, clypeo, scapo flagelloque articulo primo rufo-ferrugineis; alis flavo-hyalinis, apice late infuscatis, venis basi ferrugineis, apice fuscis.

Long. 18-20 mm.

♀. Clypeus very feebly convex, longer than broad, with a small shallow emargination in the middle of the apical margin, the angles of the emargination produced into short blunt teeth. Inner margins of the eyes converging slightly towards the clypeus. Second joint of the flagellum nearly twice as long as the third, the first and second combined about equal in length to the third and fourth. Scutellum and postscutellum flat, without sulci or tubercles; median segment with a shallow median sulcus, transversely rugose-striate, the transverse ridges not very distinct and irregular, numbering ten or twelve. Petiole about equal in length to the second joint of the hind tarsus. Basal joint of the fore tarsi with a comb of six long spines.

Hab. Cue, Western Australia (*Brown*); Cunderdin, S.W. Australia (*Mrs. Lundy*).

This is very nearly related to *rugifer*, Kohl, but differs conspicuously in the colour of the thorax, legs, and wings. In *rugifer* there are more spines on the basal joint of the fore tarsi, the transverse ridges on the median segment are fewer, and there seems to be some difference in the length of the antennal joints and petiole.

It is quite possible that both this and *C. darwiniensis*, Turn., are both local forms of *rugifer*. *C. darwiniensis* has the thorax and median segment black as in *rugifer*, but the legs are red, the third abscissa of the radius is shorter than in *rhodosoma*, there is a distinct sulcus on the scutellum, and the petiole is a little shorter.

Chlorion (Proterosphex) basilicus, sp. n.

♀. Nigra; tegulis, femoribus, tibiis tarsisque brunneo-rufis; alis flavo-hyalinis, apice late infumatis; capite, thorace segmentoquo mediano dense aureo-pubescentibus.

Long. 36 mm.

♀. Clypeus convex, with a very fine median carina, second joint of the flagellum nearly as long as the third and fourth combined. Scutellum and postscutellum divided by a longitudinal sulcus, which is deeper on the scutellum than on

the postscutellum. Head, thorax, and median segment covered with dense golden pubescence, which becomes thin on the vertex, the disc of the mesonotum, and the scutellum. Petiole as long as the third joint of the hind tarsus. Basal joint of the fore tarsi with nine long spines. Third abscissa of the radius scarcely more than half as long as the first. Scutellum convex.

Hab. N. Queensland, probably from the Cape York Peninsula.

Allied to *vestitus*, Sm., but may be easily distinguished by the colour of the legs and by the much greater size, in which points it approaches *staudingeri*, Grib., from New Guinea.

Subfamily *PHILANTHINÆ*.

Cerceris calida, sp. n.

♀. Flava; capite fascia lata inter oculos, antice utrinque ad antennarum basin producta, mesonoto fasciis tribus longitudinalibus, segmento mediano area basali linea angusta basali lineaque longitudinali mediana, segmentis dorsalibus tertio quartoque basi in melio late, quintoque basi anguste nigris; petiolo fascia lata longitudinali, segmento secundo macula basali flava, area pygidiali pedibusque posticis pallide ferrugineis; alis hyalinis, cellula radiali infuscata, venis ferrugineis; flagello pallide ochraceo.

♂. Femine similis, segmento mediano area basali tota nigra.

Long., ♀ 7, ♂ 6 mm.

♀. Clypeus with the median lobe broader at the base than long, narrowed towards the apex, slightly porrect at the apex, the margin broadly and shallowly emarginate. Antennæ inserted nearly half as far again from the anterior ocellus as from the base of the clypeus, the frontal carina short, but high and pointed between the antennæ; second joint of the flagellum distinctly longer than the third; mesopleuræ without spines or tubercles; basal area of the median segment smooth, with a longitudinal sulcus and a few large punctures at the extreme base and on the sides; postscutellum smooth; the head, thorax, and abdomen coarsely and closely punctured. Petiole longer than broad, distinctly broader at the base than at the apex; pygidial area elongate-ovate, narrowly truncate at the apex.

♂. Petiole nearly twice as long as the breadth at the base; median lobe of the clypeus longer than broad.

Hab. Kuranda, N. Queensland; May.

This is nearest to *predura*, Turn., but, in addition to the

great difference in colour, the slightly porrect clypeus, the slightly broader pygidial area, and the shorter petiole are quite sufficient distinctions.

Subfamily *ARPACTINÆ*.

Key to the Genera of the Arpactinæ.

- | | |
|--|---------------------------|
| 1. Cubitus of hind wing originating before the transverse median nervure; antenna clavate; hind tarsi very long | <i>Ammatomus</i> , Costa. |
| Cubitus of hind wing originating beyond the transverse median nervure; antennæ not clavate; hind tarsi not unusually long | 2. |
| 2. First recurrent nervure received close to the apex of the first cubital cell; second near the apex of the second cubital cell | <i>Miscothyris</i> , Sm. |
| Both recurrent nervures received by the second cubital cell | <i>Arpactus</i> , Jur. |

Key to the Australian Species of Ammatomus.

♀ ♀.

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| Second dorsal segment ferruginous, with a yellow band on the apical margin | <i>A. decoratus</i> , Handl.
(= <i>ornatus</i> , Sm.). |
| Second dorsal segment wholly black | <i>A. icarioides</i> , Turn. |

Genus *MISCOTHYRIS*, Sm.

Miscothyris, Sm. Trans. Ent. Soc. London, p. 307 (1869).

(*Clytemnestra*, Spin. Gay. Hist. fis. Chile, vi. p. 341 (1851) (nec Dana).

Clytemnestra having been used by Dana for Crustacea in 1847, it cannot be used here.

I cannot see that Smith's genus is distinct from Spinola's, the tubercle on the second ventral segment of the male being almost the only good character for separation. The statement of Ashmead that the anterior tarsi in the female of *Miscothyris* are without a comb is entirely erroneous. As I understand the genus, it would include Handlirsch's groups *bipunctatus*, *chilensis*, and *thoracicus*. The type of *Clytemnestra* is *gayi*, Spin. The genus is only represented in America and Australia. Handlirsch includes it in *Gorytes* in his revision of that genus, but I think it is more convenient to treat it as a separate genus.

I have not seen *M. megalophthalmus*, Handl., but, according to Handlirsch, both recurrent nervures are received by the second cubital cell, though in other points it is nearly

related to *thoracicus*, Sm. The male only is described, and the locality given "Australia."

Key to the Australian Species of Miscothyris.

♀ ♀.

1. Second joint of flagellum slender, more than twice as long as the third; abdomen black, banded with orange; hind tibiæ swollen and strongly serrate *M. thoracicus*, Sm.
 Second joint of flagellum not slender, never more than half as long again as the third; abdomen not marked with orange; hind tibiæ not swollen 2.
2. Hind tibiæ serrate; abdomen ferruginous, with an obscure yellow spot on each side of the second segment *M. sanguinolentus*, Turn.
 Hind tibiæ spinose; abdomen more or less black 3.
3. Pronotum and fourth dorsal segment entirely black, scutellum wholly yellow; second joint of flagellum almost equal to the third *M. lucidulus*, Turn.
 Pronotum and fourth dorsal segment with yellow bands, scutellum mostly black; second joint of the flagellum nearly half as long again as the third *M. duboulayi*, Turn.

Miscothyris duboulayi, Turn.

Gorytes duboulayi, Turn. Proc. Zool. Soc. London, p. 496 (1908). ♀.

Clytemnestra duboulayi, Turn. Ann. & Mag. Nat. Hist. (8) x. p. 58 (1912).

Hab. N.W. Australia (*Du Boulay*). Probably from Nicol Bay.

A variety from Rutherglen, Victoria, is distinguished by the entire absence of the ferruginous colour on the abdomen and by the black femora. The yellow markings on the abdomen are the same as in the type, but the yellow band on the fourth dorsal segment is continuous. This species may be distinguished from *lucidulus*, Turn., by the longer second joint of the flagellum, which is nearly half as long again as the third, not nearly equal as in *lucidulus*, and by the much smaller facets of the eyes in front. The distribution of the yellow markings is also very different.

Key to the Australian Species of Arpactus.

♀ ♀.

1. Eyes not convergent towards the clypeus 2.
 Eyes strongly convergent towards the clypeus 4.

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| 2. First abdominal segment not constricted at the apex | 3. | |
| First abdominal segment constricted at the apex | | <i>A. secernendus</i> , Turn. |
| 3. Second ventral segment angular at the base; black, the second abdominal segment red | | <i>A. rubrosignatus</i> , Turn. |
| Second ventral segment not angular at the base; otherwise coloured | | <i>A. rufomictus</i> , Turn. |
| 4. Basal area of median segment smooth .. | 5. | |
| Basal area of median segment coarsely striated | 6. | |
| 5. Basal half of second dorsal segment orange | | <i>A. ciliatus</i> , Handl. |
| Second dorsal segment wholly black | | <i>A. perkinsi</i> , Turn. |
| 6. Second dorsal segment marked with orange or yellow | 7. | |
| Second dorsal segment wholly black .. | 8. | |
| 7. Three basal dorsal segments broadly banded with orange at the apex | | <i>A. tarsatus</i> , Sm. |
| Three basal dorsal segments with interrupted yellow bands at the apex | | <i>A. obesus</i> , Turn. |
| 8. Scutellum, post-scutellum, and bands of the abdomen bright orange | | <i>A. chrysozonus</i> , Turn. |
| Scutellum and post-scutellum black; bands of the abdomen yellow and narrower | | <i>A. bellicosus</i> , Sm. |

♂♂.

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| 1. Basal area of the median segment smooth | | <i>A. ciliatus</i> , Handl. |
| Basal area of the median segment striated | 2. | |
| 2. The two subapical joints of the flagellum at least more or less arched beneath, and subtuberculate or spinose at the apical angles; ventral segments 4-6 without long ciliæ | 3. | |
| The two subapical joints of the flagellum not arched or subtuberculate beneath; ventral segments 4-6 usually with long ciliæ | 5. | |
| 3. Apical joint of the flagellum with a spine at the base; abdomen black with yellow bands, first segment broad | 4. | |
| Apical joint of the antennæ without a spine; abdomen with the two basal segments mostly orange; first segment narrow | | <i>A. spinicornis</i> , Turn. |
| 4. Abdominal fasciæ continuous, and on the five basal segments | | <i>A. spryi</i> , Turn. |
| Abdominal fasciæ broadly interrupted, and on the three basal segments only .. | | <i>A. obesus</i> , Turn. |
| 5. Scutellum more or less longitudinally striated | 6. | |
| Scutellum almost smooth | 8. | |

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|--|-------------------------------|
| 6. Second dorsal segment entirely black .. | <i>A. bellicosus</i> , Sm. |
| Second dorsal segment banded with orange or yellow | 7. |
| 7. Three basal dorsal segments with broad orange fasciæ; mesonotum coarsely punctured-rugose | <i>A. tarsatus</i> , Sm. |
| Basal dorsal segment ferruginous, second with an interrupted yellow fascia; mesonotum sparsely punctured | <i>A. pretiosus</i> , Turn. |
| 8. Abdominal segments, except the third, with narrow yellow apical fasciæ | 9. |
| Abdominal segments with broad orange fasciæ or almost entirely orange | 10. |
| 9. Flagellum black | <i>A. frenchii</i> , Turn. |
| Flagellum ferruginous | <i>A. consuetipes</i> , Turn. |
| 10. Post-scutellum longitudinally striated; ventral segments 4-6 without ciliæ of long hairs | <i>A. cygnorum</i> , Turn. |
| Post-scutellum punctured; ventral segments 4-6 with ciliæ of long hairs | <i>A. aurantiacus</i> , Turn. |

Mr. Durrant has pointed out to me that the name *Arpactus* Jur., has priority for the genus over *Gorytes*, Latr., which must sink as a synonym.

Arpactus bellicosus, Sm.

Gorytes bellicosus, Sm. Trans. Ent. Soc. London, (3) i. 2, p. 55 (1862). ♀.

Gorytes dizonus, Handl. Sitzber. Akad. Wiss. Wien, civ. p. 873 (1895). ♂.

I have no doubt that these are identical, as Handlirsch suggests.

In addition to this species and *ciliatus*, Handl., the four following species may be included in the group:—

1. *Arpactus frenchii*, Turn.

Gorytes frenchii, Turn. Proc. Zool. Soc. Lond. p. 501 (1908). ♂.

This differs from Handlirsch's characters in not having the apical joint of the flagellum curved. The fourth and fifth ventral segments have ciliæ of long hairs near the apex. The fore tarsi have a few short but distinct spines; intermediate tibiæ with two strong apical spines. This species is nearer to *bellicosus* than to *ciliatus*. The type is from Victoria, but I have seen a specimen taken near Sydney.

In *bellicosus* the yellow apical bands are on the first and third segments, not on the second; in *frenchii* on the first and second, not on the third.

2. *Arpactus perkinsi*, Turn.

Gorytes perkinsi, Turn. Ann. & Mag. Nat. Hist. (S) x. p. 57 (1912). ♀.

As noticed in the description, this is near *ciliatus*, but there is no orange on the second dorsal segment and much more on the third. There are two strong spines at the apex of the intermediate tibiæ.

3. *Arpactus tarsatus*, Sm.

Gorytes tarsatus, Sm. Cat. Hym. B.M. iv. p. 366 (1856). ♂.

Gorytes eximius, Sm. Trans. Ent. Soc. London, (3) i. p. 65 (1862). ♀.

As Handlirsch points out, these are undoubtedly sexes of one species. The ciliæ on the fourth and fifth ventral segments are well developed; the apical joint of the antennæ is curved; fore tarsi not ciliated; intermediate tibiæ with one long apical spur, the second spur more slender and not more than half as long.

4. *Arpactus cygnorum*, Turn.

Gorytes cygnorum, Turn. Proc. Zool. Soc. London, p. 500 (1908). ♂.

The apical joint of the antennæ is not curved; fore tarsi not ciliate; intermediate tibiæ with one long apical spine, the second spine very short and slender; hind tibiæ with a few spines on the outer margin. The ciliæ on the ventral segments are not present in this species, possibly the long hairs may have been rubbed off.

In other points the species agrees well with the characters of the group, and is undoubtedly closely related to the other species.

Arpactus aurantiacus, sp. n.

♂. Niger; clypeo, antennis, genis, pronoto, callis humeralibus, lateribus dorsali, mesopleuris antice, tegulis, scutello, post-scutello, segmento mediano, lateribus et linea mediana nigris, abdomine, segmento primo dorsali apice angusto tertioque dimidio basali nigris, pedibusque aurantiacis; alis flavo-hyalinis, venis ferrugineis.

Long. 17 mm.

♂. Eyes convergent towards the clypeus, separated at the base of the antennæ by a distance equal to the length of the second joint of the flagellum, which is about half as long again as the third; apical joints of the flagellum missing. Posterior ocelli more than half as far again from each other as from the eyes; front slightly concave, a longitudinal

sulcus reaching the anterior ocellus. Head and thorax rather sparsely punctured; mesopleure very sparsely punctured, the sternal carina not well defined as in other species of the *ciliatus* group; the transverse groove at the base of the scutellum foveolate, but narrow and ill defined in the middle; basal area of the median segment very finely and closely obliquely striated, divided by a deep longitudinal sulcus, the sides of the segment coarsely punctured-rugose. First abdominal segment short and not very strongly narrowed to the base, ventral segments 4-6 with ciliae of long fulvous hairs, seventh dorsal segment not very small, very broadly rounded at the apex. Fore tarsi distinctly ciliated, intermediate tibiae with two strong apical spines, hind tibiae spinose. Second abscissa of the radius very short, about one-tenth of the length of the third; first transverse cubital nervure sharply bent outwards near the cubitus, emitting from the bend a scar which reaches to the base of the stigma; both recurrent nervures received by the second cubital cell; cubitus of hind wing interstitial with the transverse median nervure.

Hab. Ankertell, W. Australia (*Brown*).

Type from South Australian Museum.

In most points this fine species closely resembles *ciliatus*, but differs in the position of the cubitus of the hind wing, which is interstitial; in *ciliatus* and *perkinsi*, however, the cubitus is much nearer to the transverse median nervure than in *bellicosus* and other species of the group. Other structural points distinguishing this species from *ciliatus* are the lesser development of the sternal carina, the sculpture of the enclosed area of the median segment, and the much greater development of the second spine of the intermediate tibiae. I have only seen the female of *ciliatus* in which both of these spines are developed, but Handlirsch could only see one well-developed spine in the male, and in several species of the group the second spine is much reduced or almost obsolete in the male.

Arpactus chrysozonus, sp. n.

♀. Nigra; clypeo, scapo flagelloque articulo primo flavis; pronoto postice, callis humeralibus, tegulis, mesonoto angulis posticis, scutello, postscutello macula magna transversa, segmento dorsali primo dimidio apicali, tertio quartoque fascia lata apicali, segmento sexto, femoribus apice, tibiis tarsisque aurantiacis; alis hyalinis, area costali late infuscata, venis nigris.

Long. 13 mm.

♀. Eyes converging towards the clypeus, separated at

the base of the antennæ by a distance nearly equal to twice the length of the scape, third joint of the flagellum almost equal to the second. Posterior ocelli as far from the eyes as from each other. Head and thorax very finely and closely punctured, mesopleuræ horizontally striated on the upper portion, finely punctured on the lower portion, the carinæ as in *ciliatus*; the transverse groove at the base of the scutellum foveolate, but very narrow and indistinct in the middle. Median segment coarsely longitudinally striated, less coarsely on the basal area than elsewhere. Abdomen very finely punctured, the basal segment short, about half as broad at the apex as the second segment: pygidial area elongate-triangular, very narrowly truncate at the apex. Fore tarsi very strongly ciliate, the apical joint much swollen, the pulvilli large; hind tibiae spinose; intermediate tibiae with two strong apical spines, the one much longer than the other. Second abscissa of the radius very short, not more than one-eighth of the length of the third, cubitus of the hind wing originating at a distance beyond the transverse median nervure slightly exceeding the length of that nervure.

Hab. Brisbane (*Hacker*); October. From the Queensland Museum.

This is closely allied to *perkinsi* and *ciliatus*, but the sculpture of the median segment is very different.

Arpactus spryi, sp. n.

♂. Niger; scapo, flagello articulo primo, pronoto postice, callis humeralibus, segmentis dorsalibus 1-5 linea transversa apicali, femoribus anticis apice subtus, tibiisque anticis et intermediis macula basali flavis; tegulis, femoribus apice, tibiis tarsisque ferrugineis; alis hyalinis, venis fuscis.

Long. 9 mm.

♂. Clypeus broadly truncate at the apex; eyes strongly convergent towards the clypeus, separated at the base of the antennæ by a distance about half as great again as the length of the scape; posterior ocelli much farther from each other than from the eyes. Apical joint of the flagellum very strongly curved, with a small spine at the base, scarcely longer than the penultimate; joints 8-11 slightly produced at the apical angle, but not sufficiently to form a spine. Pronotum narrow and transverse; mesopleuræ with a distinct vertical carina in front, the mesosternum separated from the mesopleuræ by a carina, the upper part of the mesopleuræ horizontally striated, the lower part rugulose.

Mesonotum shallowly punctured; a distinct foveolate transverse groove at the base of the scutellum. Scutellum and postscutellum closely longitudinally striated; basal area of median segment strongly obliquely striated, the sides of the segment coarsely rugose. Abdomen narrowed at the base, the first segment about half as broad at the apex as the second, seventh dorsal segment small, broadly rounded at the apex; second ventral segment not angular at the base. Ventral segments without ciliæ of long hairs. Fore tarsi not ciliated, intermediate tibiæ with one long apical spine, the second spine very short and slender, hind tibiæ feebly serrate. Second abscissa of the radius very short, about one quarter of the length of the third, first transverse cubital nervure bent sharply outwards near the cubitus and emitting inwards a short spurious vein, both recurrent nervures received by the second cubital cell far apart. Cubitus of the hind wing originating at a distance beyond the transverse median nervure about half as great again as the length of that nervure.

Hab. Mordialloc, Victoria (*Spry*).

This belongs to the *ciliatus* group, differing from most species of that group in the structure of the antennæ and in the absence of long ciliæ on the ventral segments.

Arpactus obesus, sp. n.

♂. Niger; scapo subtus, pronoto linea utrinque; segmentis dorsali-bus primo tertioque fasciis apicalibus interruptis, secundo macula apicali utrinque, femoribus anticis subtus, tibiis anticis, tibiis intermediis et posticis basi, tarsis anticis, tarsisque intermediis et posticis articulis 4 basalibus dimidio basali flavis; alis hyalinis, venis fuscis.

♀. Mari similis; segmentis dorsalibus tertio quartoque fascia continua apicali, quinto macula parva flavis; flagello subtus fusco-ferrugineo.

Long., ♂ 7 mm., ♀ 8 mm.

♂. Eyes convergent towards the clypeus, separated at the base of the antennæ by a distance more than half as great again as the length of the scape; apical joint of the flagellum strongly curved, no longer than the penultimate, which is subtuberculate at the base. Posterior ocelli nearly twice as far from each other as from the eyes; a small tubercle between the antennæ; a shallow frontal sulcus reaching the anterior ocellus. Head and thorax punctured, the groove at the base of the scutellum foveolate; post-scutellum longitudinally, basal area of the median segment

obliquely striated, dorsal surface of the median segment coarsely obliquely striated at the sides, not distinctly margined; mesopleuræ horizontally striated on the upper, obliquely on the lower portion. First abdominal segment short and broad, fully half as broad at the apex as the second segment, ventral segments without ciliæ. Fore tarsi not ciliate, intermediate tibiæ with two apical spines, one distinctly longer than the other, hind tibiæ feebly serrate at the apex. Neuration as in *spryi*, but the second abscissa of the radius is very short, not more than one-eighth of the length of the third.

♀. Second ventral segment not angular at the base; pygidial area elongate-triangular. Apical joint of fore tarsi very large and stout as in most females of the group.

Hab. Yallingup, S.W. Australia; December.

This is nearest to *spryi*, but differs in the lesser development of the characters of the apical joints of the flagellum, in the tubercle between the antennæ, in the sculpture of the scutellum, and in the colour of the legs and abdomen. The second cubital cell is also shorter on the radius in the present species.

Arpactus pretiosus, sp. n.

♂. Niger; clypeo, scapo subtus, segmento dorsali secundo fascia apicali in medio anguste interrupta, femoribus anticis subtus tibiisque anticis supra flavis; tarsis intermediis et posticis flavo-maculatis; scapo subtus, segmento abdominali primo, tegulis, tibiis intermediis et posticis basi tarsisque ferrugineis; alis hyalinis, venis fuscis.

Long. 7.5 mm.

♂. Eyes convergent towards the clypeus, separated at the base of the antennæ by a distance nearly half as great again as the length of the scape; apical joint of the flagellum distinctly but not strongly curved, a little longer than the penultimate. Head and thorax punctured; a frontal sulcus reaching the anterior ocellus; the suture at the base of the scutellum foveolate; mesopleuræ horizontally striated on the upper part, obliquely rugose-striate on the lower, the carinæ as in *ciliatus*. Scutellum finely longitudinally rugose-striate; postscutellum and basal area of the median segment more coarsely longitudinally striated; dorsal surface of the median segment coarsely reticulate at the sides and distinctly margined. Abdomen very finely and closely punctured, the first segment short, fully half as broad at the apex as the second segment; the ciliæ at the apex of the fourth and fifth ventral segments

long. Fore tarsi not ciliated; intermediate tibiæ with only one distinct apical spine; hind tibiæ serrate. Neuration as in *spryi*, but the second abscissa of the radius is a little longer, and the branch from the first transverse cubital nervure is only faintly indicated.

Hab. Yallingup, S.W. Australia; January.

One male only taken.

This is another species of the *ciliatus* group.

Arpactus spinicornis, sp. n.

♂. Niger; clypeo, scapo, flagello articulo primo, pronoto linea transversa, callis humeralibus, tegulis, segmentis dorsalibus primo secundoque, secundo macula magna nigra, pedibusque aurantiacis; flagello articulis 2-11 dimidio apicali subtus albis; alis subhyalinis, venis nigris.

Long. 10 mm.

♂. Eyes convergent towards the clypeus, separated at the base of the antennæ by a distance greater than the length of the scape; second joint of the flagellum distinctly longer than the third, apical joints strongly curved, a little longer than the penultimate, the tenth and eleventh joints strongly produced at the apex beneath into blunt tubercles, the four preceding joints similarly but much less strongly produced; posterior ocelli nearly twice as far from each other as from the eyes. Head and thorax finely and rather sparsely punctured; the transverse groove at the base of the scutellum distinct and foveolate, scutellum and post-scutellum strongly longitudinally striated; basal area of median segment strongly obliquely striated, the remainder of the median segment coarsely rugose; mesopleuræ finely obliquely striated on the lower portion, more strongly horizontally striated on the upper portion, the vertical carina and sternal horizontal carina distinct as in *ciliatus*. First abdominal segment much narrowed to the base, as long as the second segment, less than half as wide at the apex as the second segment; abdomen sparsely punctured, ventral segments without long ciliæ, seventh dorsal segment rounded. Neuration as in *spryi*, but the cubitus of the hind wing is separated from the transverse median nervure by a distance equal to twice the length of that nervure. Fore tarsi not ciliated; only one spine at the apex of the intermediate tibiæ.

Hab. Beverley, S.W. Australia (*Du Boulay*).

Type from South Australian Museum.

The species belongs to the *ciliatus* group; but, as in some

of the other species of the group, the cilia of long hairs on the ventral segments is missing. The first abdominal segment is much longer and more slender than in any other species of the group except *consuetipes*. The antennal structure resembles *spryi*, but the peculiarities are rather more developed than in that species.

Arpactus consuetipes, sp. n.

♂. Niger; antennis, tegulis, femoribus apice, tibiis tarsisque ferrugineis; pronoto linea transversa, callis humeralibus, scutello macula parva, segmentisque abdominalibus primo, secundo, quarto quintoque fasciis angustis apicalibus flavis; segmentis duobus apicalibus pallide ferrugineis; alis hyalinis, venis ferrugineis.

Long. 9 mm.

♂. Eyes very strongly convergent towards the clypeus, separated at the base of the antennæ by a distance not quite equal to the length of the scape. Apical joint of the flagellum longer than the penultimate, very feebly curved. Mesopleuræ horizontally striated on the upper portion. A transverse foveolate groove at the base of the scutellum; postscutellum and basal area of the median segment coarsely longitudinally striated, the dorsal surface of the median segment on the sides rugose, separated from the sides of the segment by distinct carinæ, the sides of the segment rugose-striate. First abdominal segment narrowed to the base, at the apex only one-third of the breadth of the apex of the second segment. Fourth and fifth ventral segments with distinct apical ciliæ. Fore tarsi not ciliated; intermediate tibiæ with two equal apical spines; hind tibiæ moderately spinose. The neuration is similar to *spryi*, but the spurious vein branching from the first transverse cubital nervure is not clearly defined, and on one side the first transverse cubital nervure is incomplete, not reaching the radius.

Hab. New South Wales.

Received from Mr. C. French.

This belongs to the *ciliatus* group; the first abdominal segment is more slender than in other species of the group.

Arpactus rubrosignatus, sp. n.

♀. Nigra; segmento abdominali secundo rubro, apice anguste nigro; alis hyalinis, leviter infuscatis, venis nigris, stigmato ferrugineo.

Long. 10 mm.

♀. Eyes not convergent towards the clypeus, their inner

margins almost parallel. Antennæ rather long, the third joint of the flagellum a little longer than the second. Posterior ocelli farther from each other than from the eyes. Head and thorax very finely and closely punctured, the transverse groove at the base of the scutellum broad and foveolate. A distinct vertical carina from the prothoracic tubercles not quite reaching the sternum; mesopleuræ finely punctured. Basal area of the median segment well defined, with very strong longitudinal striæ; the sides of the dorsal surface irregularly and coarsely striated, the sides of the segment finely obliquely striated. First abdominal segment not at all constricted at the apex, the second segment not more than half as broad again at the apex as the first: second ventral segment angular at the base; abdomen opaque, very finely and closely punctured; pygidial area elongate, not very broad. Fore tarsi distinctly, but not strongly ciliated, hind tibiæ smooth. Third abscissa of the radius nearly half as long again as the second, both recurrent nervures received by the second cubital cell, first transverse cubital nervure not branched; cubitus of hind wing originating at a distance beyond the transverse median nervure not quite equal to the length of that nervure.

Hab. Between Yallingup and Busselton, S.W. Australia; September.

Except in the somewhat more strongly ciliated fore tarsi and the rather narrow pygidial area, this species does not differ appreciably in structure from the European *mystaceus*, Linn.

Arpactus secernendus, sp. n.

♀. Nigra; mandibulis, clypeo apice, antennis, pronoto linea transversa, callis humeralibus, tegulis, segmentis abdominalibus primo sextoque, pedibusque ferrugineis; segmentis 2-5 dorsalibus et ventralibus fascia angusta apicali fusco-ochracea; alis hyalinis, venis ferrugineis.

Long. 9 mm.

♀. Eyes not converging towards the clypeus, antennæ inserted as far from each other as from the eyes, the second joint of the flagellum no longer than the third. Clypeus narrowly transversely depressed on the apical margin, posterior ocelli a little farther from each other than from the eyes. Head and thorax finely and closely punctured, a vertical carina from the pronotal tubercles not extending to the sternum; a deep foveolate groove at the base of the scutellum; basal area of the median segment smooth, with a

deep longitudinal sulcus, the rest of the segment coarsely and irregularly striated. Abdomen closely and minutely punctured; the first segment narrowed to the base and somewhat constricted at the apex, not quite half as broad at the apex as the second segment; third, fourth, and fifth segments clothed with fine yellowish hairs; pygidial area in the form of a slightly elongate triangle, shining and sparsely punctured. Fore tarsi rather feebly ciliated, hind tibiae smooth, pulvilli small. Second abscissa of the radius about one-third of the length of the third; first transverse cubital nervure sharply bent outwards near the cubitus, but not emitting a sear or nervure inwards; cubitus of hind wing separated from the transverse median nervure by a distance equal to about half the length of that nervure.

Hub. S.E. Australia.

This is near the *mystuceus* group in most characters, but differs in the form of the first abdominal segment and of the second ventral segment, which is not angular at the base. In these characters it also departs further from the group than *rubrosignatus*, to which in most structural points it is closely allied. *A. rufomixtus*, Turn., is nearest to this species, but differs in the form of the first abdominal segment.

Arpactus constrictus, Sm.

Gorytes constrictus, Sm. Journ. Proc. Linn. Soc. iii. p. 160 (1859). ♂ ♀.
? *Gorytes vagus*, Sm. l. c. p. 161 (1859). ♀.

Handlirsch considers from the descriptions that these are merely colour-varieties of one species. This is very probably correct, but I have not seen typical *constrictus*, which is from Aru. There is a female specimen of *vagus* from Ké in the British Museum. It belongs to the group *stenopygus*, Handl., having the pygidial area very narrow, otherwise agreeing well with the *mystuceus* group.

Subfamily NYSSONINÆ.

Key to the Australian Species of Nysson (Acanthostethus).

♂♂.

- | | |
|--|-------------------------------|
| 1. Seventh dorsal segment with more than two apical spines | 2. |
| Seventh dorsal segment with two apical spines only | 7. |
| 2. Seventh dorsal segment with a row of five acute apical spines | <i>N. nudicentris</i> , Turn. |

- Seventh dorsal segment with three apical spines 3.
3. Ventral segments 2-4 with an apical fringe of long hairs 4.
- Ventral segments without a fringe of long hairs *N. saussurei*, Handl.
4. Abdominal segments 3-6 with a spine on each side at the apical angles 5.
- Abdominal segments 3-6 without spines at the apical angles *N. mysticus*, Gerst.
5. Dorsal surface of median segment much shorter than scutellum; basal dorsal segment black *N. mærens*, Turn.
- Dorsal surface of median segment about as long as scutellum; basal dorsal segment ferruginous 6.
6. Basal area of median segment coarsely longitudinally striated; second recurrent nervure interstitial. Length 7 mm. Basal area of median segment finely obliquely striated; second recurrent nervure received before the first transverse cubital nervure. Length 4-5 mm. *N. confertus*, Turn.
7. Median segment with a blunt tubercle on each side of the truncation, below the large spines of the apical angles *N. minutus*, Turn.
- Median segment without tubercles below the spines of the apical angles 8.
8. Segments 3-5 with a distinct spine on each side at the apical angles; ventral segments 2-5 with an apical fringe of long hairs *N. punctatissimus*, Turn.
- Median segment without tubercles below the spines of the apical angles 8.
8. Segments 3-5 with a distinct spine on each side at the apical angles; ventral segments 2-5 with an apical fringe of long hairs *N. obliteratedus*, Turn.
- Segments 3-5 without spines 9.
9. Ventral segments 2-5 with an apical fringe of long hairs *N. gilberti*, Turn.
- Ventral segments without a fringe of long hairs 10.
10. Basal abdominal segment red *N. spiniger*, Turn.
- Basal abdominal segment black *N. tasmanicus*, Turn.

♀ ♀.

1. Sixth dorsal segment serrate at the sides, with three or four teeth; segments 3-5 with acute spines on each side at the apical angles 2.
- Sixth dorsal segment not serrate; segments 3-5 without spines 3.
2. Enclosed area of median segment with about five longitudinal carinæ *N. nudiventris*, Turn.
- Enclosed area of median segment without distinct striæ or carinæ *N. brisbanensis*, Turn.
3. Median segment with a short blunt tubercle on each side of the truncation below the spines of the apical angles *N. punctatissimus*, Turn.
- Median segment without tubercles below the spines of the apical angles 4.

4. First abdominal segment ferruginous 5.
 First abdominal segment black *N. tasmanicus*, Turn.
5. Dorsal surface of the median segment
 much shorter in the middle than the
 scutellum 6.
 Dorsal surface of the median segment
 about as long in the middle as the
 scutellum *N. gilberti*, Turn.
6. Pronotum ferruginous; length 8 mm. *N. mysticus*, Gerst.
 Pronotum black; length 4.5 mm. *N. spiniger*, Turn.

Nysson (Acanthostethus) nudiventris, sp. n.

♂. Niger; mandibulis, antennis, pedibus segmentoque abdominali primo ferrugineis; segmentis dorsalibus 1-5 fascia angusta apicali utrinque flava; alis hyalinis, leviter infuscatis; segmento dorsali septimo apice quinque-dentato.

♀. Mari similis, segmentis 2-5 apice et lateribus ferrugineis; segmento sexto dorsali serrato.

Long., ♂ 5.5, ♀ 6.5 mm.

♂. Head and thorax coarsely rugose. dorsal area of the median segment coarsely longitudinally striated, abdomen closely punctured. Apical joint of the flagellum scarcely curved, longer than the penultimate. Abdominal segments 3-5 with an acute spine on each side at the apical angles; seventh dorsal segment with five apical spines, the three middle spines long and even, the outer spine on each side much shorter. Second recurrent nervure interstitial with the first transverse cubital nervure, second cubital cell pointed on the radius.

♀. Dorsal surface of the median segment much shorter than the scutellum, the basal area with about five longitudinal carinae. Abdominal segments 3-5 with an acute spine on each side at the apical angles; sixth dorsal segment rounded, the sides serrate, with three teeth on each side. Hind tibiae almost smooth. Second ventral segment not angular at the base. Second cubital cell with a very short petiole.

Hab. Yallingup, S.W. Australia; December.

A pair taken on *Leptospermum* blossom.

The male has no fringe of long hairs on the ventral segments.

Nysson (Acanthostethus) brisbanensis, sp. n.

♀. Nigra; mandibulis, antennis, pedibus, tegulis segmentisque abdominalibus primo sextoque ferrugineis, segmentis dorsalibus 1-5 fascia apicali continua flava; alis hyalinis; segmento dorsali sexto serrato.

Long. 6.5 mm.

♀. Head and thorax rugose, abdomen closely punctured; basal area of median segment irregularly and rather finely reticulate; sixth dorsal segment rugose. Clypeus without carinæ, very shallowly emarginate at the apex, the angles of the emargination very feebly produced. Median segment much shorter than the scutellum. Second ventral segment convex, not angular at the base; segments 3-5 with a spine on each side at the apical angles; sixth dorsal segment rounded, serrate at the sides, with at least four teeth on each side. Hind tibiæ almost smooth. Second recurrent nervure interstitial with the first transverse cubital nervure; second cubital cell petiolate.

Hab. Brisbane; January (*Hacker*). From the Queensland Museum.

This is near *nudiventris*, but the sculpture of the median segment differs; also the shape of the pygidium and the number of teeth on the sides.

Nysson (Acanthostethus) confertus, sp. n.

♂. Niger; flagello basi subtus, scapo apice, tegulis, abdomine segmento primo, segmentis 2-7 linea transversa apicali, pedibusque ferrugineis; segmentis dorsalibus 1-5 macula transversa apicali utrinque flava; alis hyalinis, venis fusco-ferrugineis.

Long. 7 mm.

♂. Clypeus widely and shallowly emarginate at the apex, the angles of the emargination produced into short spines. Apical joint of the flagellum slightly curved, hollowed beneath and scarcely longer than the penultimate. Head, thorax, and abdomen closely punctured, the punctures on the abdomen becoming gradually finer from the base; basal area of the median segment coarsely longitudinally striated, the dorsal surface of the median segment as long as the scutellum. Ventral segments 2-4 with an apical fringe of long whitish hairs, segments 3-5 with a small spine on each side at the apical angles; seventh dorsal segment with three spines at the apex, the middle one blunt and subtriangular. Second recurrent nervure interstitial with the first transverse cubital nervure, second cubital cell with a short petiole.

Hab. Cairns, Queensland (*Dodd*).

I do not think that this can be the male of *brisbanensis*, owing to the much longer median segment, the difference in the sculpture of the median segment, and the much finer puncturation.

Nysson (Acanthostethus) minimus, sp. n.

♂. Niger; mandibulis, scapo, flagello articulis tribus basalibus, pronoto, tegulis, segmentis abdominalibus subtus, segmento dorsali primo, nonnumquam nigro-maculato, segmentis 2-7 linea transversa apicali, pedibusque ferrugineis; segmentis dorsalibus 1-4 macula transversa utrinque flava; alis hyalinis, venis fuscis.

Long. 4-5 mm.

♂. Coarsely punctured, the abdomen very finely and closely punctured, with large scattered punctures on the basal segment and on the second ventral segment, dorsal surface of the median segment as long as the scutellum, the basal area irregularly obliquely striated. Clypeus widely emarginate at the apex, the angles of the emargination not produced into distinct teeth. Ventral abdominal segments 2-4 with a fringe of long hairs at the apex, segments 3-5 with a spine at the apical angle on each side, seventh dorsal segment with three apical teeth, the middle one blunt and broad. The apical joint of the flagellum is rather strongly curved and hollowed beneath, longer than the penultimate. Second recurrent nervure received by the first cubital cell very near the apex; second cubital cell small, with a short petiole.

Hab. Kuranda, N. Queensland (*Dodd*) (*G. Turner*); March.

This is near *confertus*, but differs in the sculpture of the median segment and the neuriation.

Nysson (Acanthostethus) mærens, sp. n.

♂. Niger; mandibulis basi pedibusque ferrugineis; antennis fuscis apice ferrugineis; tegulis fusco-ferrugineis; segmentis dorsalibus primo secundoque linea apicali brevi utrinque flava; alis hyalinis, leviter infuscatis; segmento dorsali septimo apice obtuse tridentato.

Long. 6.5 mm.

♂. Head and thorax coarsely punctured-rugose, abdomen closely and rather shallowly punctured; basal area of median segment irregularly longitudinally striated, the surface of the posterior truncation finely longitudinally striated in the middle, rugose on the sides. Apical joint of the flagellum conical, nearly twice as long as the penultimate. Median segment much shorter in the middle than the scutellum. Segments 3-5 with a distinct spine on each side at the apical angles; seventh dorsal segment broad,

tridentate at the apex, the middle tooth very blunt, and almost more of an angular apex to the segment than a tooth. Hind tibiae feebly serrate. Second recurrent nervure interstitial with the first transverse cubital nervure, second cubital cell petiolate, the petiole extremely short.

Hab. Yallingup, S.W. Australia; January.

In colour this resembles *tasmanicus*, but is distinguished by the spines on segments 3-5 and the shape of the seventh dorsal segment. There is also a fringe of long hairs on the apex of ventral segments 2-5 in the present species, but not in *tasmanicus*.

Nysson (Acanthostethus) gilberti, sp. n.

♀. Nigra; mandibulis basi, scapo subtus, flagello articulis duobus basalibus, tegulis, segmento dorsali primo dimidio basali, segmento sexto, pedibusque ferrugineis: segmento mediano angulis apicalibus segmentisque dorsalibus linea angusta apicali aureo-pilosis; alis hyalinis, venis nigris.

♂. Feminae similis, segmentis dorsalibus primo secundoque linea apicali angusta flava.

Long., ♀ 8 mm., ♂ 7 mm.

♀. Clypeus almost truncate at the apex, with an acute spine on each side. Head and thorax coarsely punctured; basal segment of the abdomen strongly, the other segments rather finely punctured; pygidial area rugulose. Median segment as long in the middle as the scutellum, the basal area coarsely but irregularly longitudinally striated. Second ventral segment not angular at the base. Second recurrent nervure received close to the apex of the first cubital cell, not quite interstitial with the first transverse cubital nervure; second cubital cell with a short petiole. Hind tibiae feebly serrate.

♂. Seventh dorsal segment with an apical spine on each side, the space between the spines very feebly rounded; third to fifth segments without spines at the apical angles; segments 2-5 with an apical fringe of long hairs; second recurrent nervure interstitial with the first transverse cubital nervure; second cubital cell pointed, not petiolate.

Hab. Cairns, N. Queensland (*Turner*); December to February.

I think I have associated the sexes rightly, the slight differences in the neuration do not appear to be of specific importance.

The female is the type.

Nysson (Acanthostethus) tasmanicus, sp. n.

♀. Nigra, opaca, dense punctata; mandibulis pedibusque rufotestaceis; segmentis dorsalibus 1-5 macula transversa laterali utrinque flavidula; alis hyalinis, venis nigris.

Long. 6 mm.

♀. Clypeus broadly and shallowly emarginate at the apex. Antennæ inserted as near to the eyes as to each other, gradually thickened to the apex, the apical joint nearly twice as long as the penultimate. Eyes separated at the base of the clypeus by a distance equal to about twice the length of the scape, strongly divergent towards the vertex, the posterior ocelli half as far again from the eyes as from each other. Head closely and rather finely punctured, clothed with short silver pubescence; a strong longitudinal carina on the front between the antennæ, not reaching halfway to the anterior ocellus. Thorax rather more coarsely punctured than the head; median segment irregularly rugose-striate, the posterior angles produced into stout spines and clothed with silver pubescence. Abdomen closely punctured, but less coarsely than the thorax, second ventral segment more coarsely punctured, apical dorsal segment broadly triangular and punctured-rugose. Second cubital cell pointed, sometimes distinctly petiolate, second recurrent nervure interstitial with the first transverse cubital nervure. Hind tibiæ almost smooth, with a few very short spines.

Hab. Mount Wellington, 2300 ft.; Eaglehawk Neck, S.E. Tasmania. February.

Near *A. punctatissimus*, Turn., but differs in the form of the clypeus, the finer puncturation, and the smoother hind tibiæ.

The male is very similar to the female, it has the seventh dorsal segment broadly truncate at the apex, with a spine at each of the apical angles. There is no fringe of long hairs on the ventral segments.

Subfamily CRABRONINÆ.

Key to the Australian Species of Rhopalum.

♀ ♀.

- | | |
|---|---------------------------------|
| 1. First abdominal segment shorter than the second | 2. |
| First abdominal segment as long as or longer than the second | 3. |
| 2. Head very large; eyes nearly as far from the posterior margin of the head as from each other | <i>R. macrocephalus</i> , Turn. |

- Head not unusually large; eyes more than twice as far from each other as from the posterior margin of the head.
3. Hind tibiae not perceptibly spinose 4. *R. frenchii*, Turn.
- Hind tibiae more or less spinose 5.
4. Pronotum rounded at the angles; intermediate femora yellow; abdomen marked with ferruginous *R. tenuiventre*, Turn.
- Pronotum transverse, angles well defined; abdomen and intermediate femora black *R. eucalypti*, Turn.
5. Abdomen more or less red 6.
- Abdomen wholly black 7.
6. Spines of hind tibiae strong; petiole distinctly longer than the second segment *R. tricolor*, Sm.
- Spines of hind tibiae feeble; petiole equal in length to the second segment *R. tricolor imbellis*, Turn.
7. Pronotum transverse, the angles well defined 8.
- Pronotum rounded at the angles 9.
8. Wings fusco-hyaline; a very broad depression from the inner margin of the eye nearly reaching the posterior ocelli; basal area of median segment finely and closely punctured *R. leptospermi*, Turn.
- Wings hyaline, iridescent; a narrow sulcus from the inner margin of the eye to the posterior ocelli; basal area of median segment rugose *R. cygnorum*, Turn.
9. With a broad depression from the inner margin of the eye nearly reaching the posterior ocelli 10.
- Without a depression from the inner margin of the eye towards the posterior ocelli *R. littorale*, Turn.
10. Median segment with a longitudinal sulcus; recurrent nervure received beyond three-quarters from the base of the cubital cell *R. aliciae*, Turn.
- Median segment without a sulcus; recurrent nervure received at about three-fifths from the base of the cubital cell *R. varūtarse*, Turn.

Rhopalum macrocephalus, sp. n.

♀. Nigra; mandibulis, apice excepto, scapo, flagello articulo primo, tuberculis humeralibus, tegulis, coxis anticis subtus, trochanteribus, femoribus anticis intermediisque, tibiis tarsisque anticis et intermediis, tibiisque posticis basi flavis; segmentis abdominalibus margine apicali et subtus fusco-ferrugineis; alis hyalinis, venis nigris.

Long. 6 mm.

♀. Head shining, very large, longer than broad; the

posterior ocelli nearly as far from each other as from the eyes, more than twice as far from the posterior margin of the head as from each other; eyes separated at the base of the clypeus by a distance about equal to half the length of the scape. Thorax narrower than the head; the pronotum depressed, strongly rounded at the angles; mesonotum shining, microscopically punctured, without a sulcus. Median segment smooth, with a shallow and rather indistinct median sulcus, a narrow transverse foveolate groove at the base. First abdominal segment a little shorter than the second, the apical half somewhat swollen, but not forming a conspicuous node. Hind tibiæ swollen, with three or four short spines on the outer margin near the apex. Recurrent nerve received a little before two-thirds from the base of the cubital cell.

Hub. Caloundra, near Brisbane; September. On tree-trunks. (From Queensland Museum.)

There is no distinct depression between the inner margin of the eyes and the posterior ocelli. The species is easily distinguished by the great length of the head behind the eyes.

Rhopalum frenchii, Turn.

Crabro (*Rhopalum*) *frenchii*, Turn. Proc. Zool. Soc. London, p. 523 (1908). ♀.

Hub. Mt. Wellington, 2300 ft.; January to April. Eaglehawk Neck; February.

Also from Victoria; a single specimen taken at Yallingup S.W. Australia.

Taken burrowing in a bank by the roadside on Mt. Wellington, also on a *Eucalyptus* log at Eaglehawk Neck; the specimen at Yallingup was taken on a live Jarrah tree.

The male has the petiole longer and less clavate than the female. The spines on the hind tibiæ are almost obsolete.

Rhopalum leptospermi, sp. n.

♀. Nigra; scapo, femoribus anticis et intermediis, femoribus posticis subtus, tibiisque anticis flavis; alis fusco-hyalinis, venis nigris.

♂. Feminae similis; tarsis ochraceis, articulo apicali nigro.

Long., ♀ 14 mm., ♂ 11 mm.

♀. Clypeus slightly produced at the apex and shallowly emarginate, the angles of the emargination forming short triangular teeth. Eyes separated at the base of the clypeus by a distance equal to about one-third of the length of the

scape; posterior ocelli more than half as far again from the eyes as from each other, a little nearer to the posterior margin of the head than to the eyes; a broad oblique depression from the inner margin of the eyes not reaching the posterior ocelli. Front strongly concave and shining, the rest of the head and thorax subopaque. Pronotum transverse, with a distinct dorsal surface, the angles well defined, not rounded, without a sulcus. Mesonotum without a sulcus; a narrow, transverse, crenulated line at the base of the median segment, the triangular area of the median segment well defined and divided by a longitudinal sulcus. First abdominal segment nearly half as long again as the second, a little swollen at the apex, the second segment about three times as wide at the apex as the first. Fifth dorsal segment thickly clothed with very delicate golden-brown pubescence; pygidial area sparsely punctured at the base, smooth at the apex. Recurrent nervure received beyond three-quarters from the base of the cubital cell, at a distance from the apex scarcely exceeding the length of the transverse cubital nervure. Hind tibiæ swollen on the apical half, strongly spinose.

♂. As in the female; but the depressions on the inner margin of the eyes are much smaller, and the second abdominal segment is distinctly longer and more slender in proportion to the first.

Hab. Yallingup, S.W. Australia; October and November. Warren River, S.W. Australia (*W. D. Dodd*).

I took the male in some numbers on *Leprospermum* blossom, but the only female was taken from an Asilid fly. Mr. Dodd took two females on the Warren River, but no males.

Rhopalum cygnorum, sp. n.

♀. Nigra; scapo, femoribus, tibiis tarsisque anticis, femoribus tibiisque intermediis subtus, tarsis intermediis, tuberculisque humeralibus flavis; alis hyalinis, iridescentibus, venis nigris; flagello subtus brunneo.

Long. 5 mm.

♀. Eyes separated from each other at the base of the clypeus by a distance nearly equal to half the length of the scape; posterior ocelli far apart, farther from each other than from the eyes or from the posterior margin of the head; a narrow oblique sulcus running from the inner margin of the eyes to the posterior ocelli. Head finely and closely punctured; thorax shining, almost smooth. Pronotum transverse, with a distinct dorsal surface, the angles well

defined, not rounded; mesonotum without a sulcus. Triangular area at the base of the median segment coarsely rugose, not divided by a sulcus. First abdominal segment longer than the second, very slender at the base, swollen at the apex; the second segment about four times as wide at the apex as the first. Pygidial area sparsely punctured. Recurrent nervure received just before two-thirds from the base of the cubital cell. Hind tibiæ moderately spinose.

Hab. King's Park, Perth, W. Australia.

One female taken on *Eucalyptus* blossom.

Rhopalum variitarse, sp. n.

♀. Nigra, nitida; scapo subtus, tibiis anterioribus supra, tarsis anterioribus intermediisque, articulo apicali excepto, tarsisque posterioribus articulis tribus intermediis flavis; alis hyalinis, venis nigris.

Long. 8 mm.

Clypeus with a carina from the base to the middle, covered with white pubescence. Eyes separated at the base of the antennæ by a distance equal to about one-third of the length of the scape. A broad longitudinal groove on the inner margin of the eyes, level with the anterior ocellus. Posterior ocelli a little farther from each other than from the anterior ocellus, a little farther from the eyes than from each other, with a short longitudinal sulcus between them. Mesonotum subcarinate in the middle, basal area of the median segment smooth and shining, without a median groove. First abdominal segment as long as the second, slender at the base, the apical half strongly swollen; second segment broadened from the base; fifth segment sparsely covered with grey pubescence; pygidial area shining, sparsely punctured, elongate-triangular. Hind tibiæ much swollen towards the apex, armed on the outer side with a row of small spines. Radial cell broadly truncate at the apex, transverse cubital nervure joining the radius close to one-third from the base of the radial cell, the recurrent nervure received just beyond the middle of the cubital cell.

Hab. Mt. Wellington, 2300 ft.; January. Eaglehawk Neck; February.

Allied to the New Zealand species *R. albipes* and *R. perforator*, Sm., but differs from both in the less spinose tibiæ and in other details of structure and colour. The tarsi are coloured as in the male of *albipes*, Sm., but in that species the female differs from the male in this point.

Rhopalum eucalypti, sp. n.

♀. Nigra; scapo subtus, tarsis anticis intermediisque, tibiis anticis intermediisque supra, tibiisque posticis subtus albido-flavis; alis hyalinis, iridescentibus, venis nigris.

Long. 6.5 mm.

Clypeus without a carina, shallowly emarginate at the apex, the angles of the emargination forming very short teeth. Eyes separated at the base of the antennæ by a distance equal to about three-quarters of the length of the scape; no broad groove on the inner margin of the eye level with the anterior ocellus, but a narrow shallow sulcus runs from the eye to the posterior ocelli, which are as far from each other as from the eye. Dorsal surface of the median segment smooth and shining, with a rather obscure median sulcus and a few very short striæ at the base. Petiole longer than the second segment, the apical third moderately swollen; second segment slender, fully twice as long as the apical breadth; pygidial area triangular, not very sharply defined. Hind tibiæ swollen towards the apex, without spines. Radial cell broadly truncate at the apex; transverse cubital nervure joining the radius at two-fifths from the base of the radial cell; recurrent nervure received at about three-fifths from the base of the cubital cell.

Hab. Eaglehawk Neck; March.

Taken on a dead *Eucalyptus* log.

This is a more slender species than *varitarse*, and is without the groove on the inner margin of the eye and the spines on the hind tibiæ. The eyes are much farther apart on the front, in this character more nearly approaching *frenchii*, from which it is easily distinguished by the long petiole.

Rhopalum alicia, sp. n.

♀. Nigra, subnitida; scapo, tuberculis humeralibus, femoribus anticis intermediisque apice, tibiis basi, tarsisque articulo apicali excepto albido-flavis; alis hyalinis, venis nigris.

♂. Feminae similis.

Long., ♀ 12, ♂ 9 mm.

♀. Eyes separated at the base of the clypeus by a distance equal to about two-thirds of the length of the scape. Posterior ocelli nearly half as far again from the eyes as from each other, a little farther from the eyes than from the posterior margin of the head; a broad oblique depression reaching from the inner margin of the eye almost to the posterior

ocelli; a short longitudinal sulcus between the posterior ocelli. Pronotum strongly rounded at the angles, with a short median longitudinal sulcus; a shallow almost obsolete sulcus reaching from the anterior margin of the mesonotum to the middle. A narrow, transverse, crenulated furrow at the base of the postscutellum, and another at the base of the median segment; a distinct longitudinal sulcus running from the base to the apex of the median segment. First abdominal segment distinctly longer than the second, the apical half moderately swollen, half as wide at the apex as the apex of the second segment. Pygidial area coarsely punctured-rugose at the base, with a median carina, smooth and shining at the apex. Hind tibiae swollen and strongly spinose. Recurrent nervure received just beyond three-quarters from the base of the cubital cell, at a distance from the apex of the cell scarcely equal to the length of the transverse cubital nervure.

♂. The male has the head less produced behind the eyes, the posterior ocelli being only a little farther from the posterior margin of the head than from each other; the depressions between the eyes and the posterior ocelli are much smaller and the abdomen much more slender.

Hab. Yallingup, S.W. Australia; October and November.

Taken burrowing in sand, the males flying low over the sand.

Nearly related to *R. variitarse* from Tasmania, but differs in the presence of a sulcus on the median segment, in the position of the recurrent nervure, and in the sculpture of the pygidial area.

Rhopalum littorale, sp. n.

♀. Nigra; scapo subtus, tibiis anticis extus, tarsisque anticis et intermediis, articulo apicali excepto albido-flavis; alis hyalinis, iridescentibus, venis nigris.

Long. 6 mm.

♀. Eyes separated at the base of the clypeus by a distance equal to about one-quarter of the length of the scape. Posterior ocelli as far from each other as from the eyes, and about the same distance from the posterior margin of the head; a short longitudinal sulcus between the posterior ocelli. A narrow groove along the inner margin of the eyes, but no broad depression running towards the posterior ocelli. Pronotum depressed, without a distinct dorsal surface, rounded at the angles; mesonotum without a sulcus. Median segment with a transverse crenulated line at the

base, the triangular area divided by a longitudinal sulcus. First abdominal segment about equal in length to the second, the apical half rather strongly swollen; pygidial area smooth and shining at the apex. Recurrent nervure received just before two-thirds from the base of the cubital cell, at a distance from the apex almost equal to twice the length of the transverse cubital nervure. Hind tibiæ swollen and spinose.

Hab. Yallingup, S.W. Australia; November.

This is near *R. frenchii*, but the petiole is longer and the colour of the legs different. It is also a much larger species.

Rhopalum tricolor, Sm.

Crabro tricolor, Sm. Cat. Hym. B.M. iv. p. 394 (1856). ♂.

Crabro (Rhopalum) militaris, Turn. Proc. Zool. Soc. London, p. 523 (1908). ♂.

Crabro (Rhopalum) tricolor, Turn. Proc. Zool. Soc. London, p. 524 (1908). ♀ ♂.

Smith's type is lost, but from a long series of Tasmanian specimens I have no doubt there is only one species, and that *militaris*, Turn., is quite a usual form of the species, the form identified by me as *tricolor* being a dark colour-variety found in the mountain-districts of New South Wales and Victoria.

Hab. Eaglehawk Neck; February. Mt. Wellington, 2200 ft.; January.

Also from S.E. Australia. A closely allied form is common in S.W. Australia, but differs in the slightly shorter petiole, in the almost obsolete spines of the hind tibiæ, and in the slightly nearer approach to each other of the posterior ocelli. For this form I propose the name *Rhopalum tricolor imbelle*, subsp. n.

R. tricolor was taken freely on *Leptospermum*, also burrowing in sandy banks.

CRABRO (subgenus *Solenius*).

I use the name *Solenius* in a wider sense than Ashmead. The Australian species of *Crabro* do not fall well into Ashmead's genera, which were founded without the study of any large exotic collection. The species included here in *Solenius* fall into more than one group of species, but in all the female has the mandibles tridentate, a supraorbital fovea, and a carina on the mesopleuræ before the intermediate coxæ. *C. tridentatus* and *tasmanicus* have the clypeus very

differently formed from the others, the mandibles less distinctly tridentate, and a spine on the anterior femora of the male; the second joint of the flagellum is also very long. *C. ordinarius*, *manifestatus*, *bivittatus*, and *neglectus* form another group nearly related to the last; whilst *C. conglobatus* and *cinctus* have the male antennæ normal and no carina on the clypeus. In the two latter species and in *hebetescens* the tooth on the inner side of the mandibles near the base is well developed, which, so far as I can see, is not the case in the other species.

Key to the Australian Species of Crabro (Solenius).

♀ ♀.

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| 1. Clypeus with a carina | 2. |
| Clypeus without a carina | 8. |
| 2. With an orange or yellow band, entire or interrupted, on the base of the second dorsal segment | 3. |
| Without an orange or yellow band on the second dorsal segment | 7. |
| 3. Clypeus produced into a strong porrect tooth at the apex, with a tooth on each side at the lateral angles | 4. |
| Clypeus not produced into a porrect tooth, lateral angles without teeth | 5. |
| 4. Transverse band of second dorsal segment orange, broad, and entire; three apical segments orange | <i>C. tridentatus</i> , Sm. |
| Transverse band of second dorsal segment yellow, narrow, and interrupted; basal half of fourth dorsal segment yellow; two apical segments black | <i>C. tasmanicus</i> , Sm. |
| 5. Fourth dorsal segment with a transverse orange or yellow band at the base | 6. |
| Fourth dorsal segment entirely black | <i>C. manifestatus</i> , Turn. |
| 6. Band of the second segment orange and broad; scutellum and post-scutellum entirely black | <i>C. bivittatus</i> , Turn. |
| Band of the second segment yellow and narrow; scutellum with a yellow spot at the basal angles, post-scutellum with a transverse yellow band | <i>C. ordinarius</i> , Turn. |
| 7. Second dorsal segment entirely black | <i>C. mackayensis</i> , Turn. |
| Five basal dorsal segments with lateral white spots | <i>C. hebetescens</i> , Turn. |
| 8. Clypeus with a small semicircular truncation at the slightly porrect apex; anterior angles of pronotum pointed; three apical dorsal segments orange | <i>C. cinctus</i> , Turn. |
| Clypeus without an apical truncation, not porrect; anterior angles of pronotum obtuse; three apical dorsal segments black | <i>C. conglobatus</i> , Turn. |

♂♂.

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| 1. Basal joints of the flagellum not normal, at least with a notch between the second and third joints beneath; clypeus with a longitudinal carina | 2. | |
| Basal joints of the flagellum normal; clypeus without a carina | 7. | |
| 2. Anterior femora with a spine beneath near the base | 3. | |
| Anterior femora without a spine | 4. | |
| 3. Transverse band of second dorsal segment orange, broad, and entire | | <i>C. tridentatus</i> , Sm. |
| Transverse band of second dorsal segment yellow, narrow, and interrupted | | <i>C. tasmanicus</i> , Sm. |
| 4. Fourth dorsal segment banded with yellow or orange | 5. | |
| Fourth dorsal segment wholly black | 6. | <i>C. manifestatus</i> , Turn. |
| 5. Scutellum and postscutellum wholly black . | 6. | |
| Scutellum with yellow spots at the basal angles; postscutellum with a transverse yellow band | | <i>C. ordinarius</i> , Turn. |
| 6. Transverse band of second dorsal segment broad and entire | | <i>C. bivittatus</i> , Turn. |
| Transverse band of second dorsal segment narrow and interrupted | | <i>C. neglectus</i> , Sm. |
| 7. Second joint of the flagellum no longer than the third; band on the second dorsal segment broad and entire; third wholly black | | <i>C. cinctus</i> , Turn. |
| Second joint of the flagellum much longer than the third; band on the second dorsal segment narrow and interrupted; third with a narrow transverse band on each side | | <i>C. conglobatus</i> , Turn. |

The males of *C. mackayensis* and *C. hebetescens* are unknown, as is also the female of *C. neglectus*.

Crabro (Solenius) neglectus, Sm.

Crabro neglectus, Sm. Trans. Ent. Soc. London, p. 249 (1868). ♂.

I have not included this species in the key to the females, because it is known only in the male sex. It seems to be most nearly allied to *bivittatus*, but the orange bands at the base of the second and fourth dorsal segments are narrow and that on the second interrupted; the angles of the pronotum are also more distinctly pointed and the first abdominal segment is broader and shorter.

Crabro (Solenius) tasmanicus, Sm.

Crabro tasmanicus, Sm. Cat. Hym. B.M. iv. p. 425 (1856). ♂ (as ♀).

This is in my opinion the Tasmanian race of *C. tridentatus*, Sm., the differences being mainly in colour. The orange colour, so conspicuous in Australian Aculeates, and of which *C. tridentatus* is a good example, does not seem to be indigenous in Tasmania, being confined in that island to one or two large Psammocharidæ such as *Prionemis bicolor*, Fabr., and to the bee *Hylæoides concinnus*, Fabr., which are probably stragglers from the mainland, where they are common species.

Crabro (Solenius) manifestatus, sp. n.

♀. Nigra; scapo, pronoto, scutello macula utrinque angulis basalibus, segmento dorsali secundo dimidio apicali flavis; flagello basi, callis humeralibus, tegulis pedibusque ferrugineis; alis hyalinis, venis nigris.

♂. Feminae similis; aurantiaco haud flavo-variegatus; scutelli maculis duplicatis.

Long., ♀ 11, ♂ 7 mm.

♀. Clypeus with a carina from the base to the apex, not produced or dentate at the apex; eyes separated at the base of the clypeus by a distance equal to about one-third of the length of the scape; front concave, not margined above; second joint of the flagellum as long as the first and third combined. Posterior ocelli farther from each other than from the eyes, and farther from the posterior margin of the head than from each other; a short sulcus on each side along the inner margin of the eyes near the summit. Head very minutely, thorax more distinctly punctured; anterior angles of the pronotum acute; scutellum with a crenulate transverse furrow at the base; enclosed area of the median segment no longer than the scutellum, divided by a longitudinal groove, obliquely striated, coarsely at the sides, less distinctly in the middle, with a transverse crenulate furrow at the base. Abdomen opaque, minutely and very closely punctured, pygidial area elongate; posterior tibiæ serrate. Transverse cubital nervure received just beyond the middle of the radial cell, recurrent nervure received at a distance from the apex of the cubital cell equal to about half the length of the transverse cubital nervure.

♂. Third joint of the flagellum excised at the base beneath; sculpture of the basal area of the median segment irregularly rugose; transverse cubital nervure received just

before the middle of the radial cell, recurrent nervure received at a distance from the apex of the cubital cell equal to the length of the cubital nervure.

Hab. Kalamunda, S.W. Australia; February.

The female is the type. I am not sure that these are sexes of the same species, owing to the difference in colour and in the sculpture of the median segment. The female is nearest to *bivittatus*, Turn., but differs in the sculpture of the median segment, in the absence of a band on the fourth dorsal segment, and in the yellow instead of orange markings.

Crabro (Solenius) serenus, sp. n.

♀. Nigra; scapo, pronoto fascia utrinque, callis humeralibus, mesopleuris antice macula magna, mesonoto macula parva utrinque angulis anticis, scutello macula utrinque, postscutello linea transversa, segmento mediano maculis 4 magnis, anguste separatis, segmento dorsali primo macula curvata utrinque, secundo macula transversa utrinque, tertio macula parva obscura utrinque, femoribus anticis macula apicali, tibiisque anticis externe basi flavis; alis fusco-hyalinis, apice obscure cærulescentibus, venis nigris.

Long. 12 mm.

♀. Mandibles tridentate, the inner tooth short; clypeus with a carina from the base branching in the middle and enclosing an elongate-triangular apical area, the angles of the area produced into short teeth, a short tooth on each side near the outer angles of the clypeus. Eyes separated at the base of the antennæ by a distance slightly exceeding half the length of the scape, the second joint of the flagellum as long as the first and third combined. Front between the eyes concave; posterior ocelli about equidistant from the eyes and from each other, farther from the posterior margin of the head than from each other; a broad groove along the inner margin of the eyes near the summit. Pronotum with the anterior margin slightly raised and produced into minute spines at the anterior angles. Head and thorax minutely punctured, subopaque; basal area of median segment smooth, divided by a crenulate longitudinal furrow, the sides of the segment smooth and opaque. First abdominal segment gradually broadened from the base, longer than the second, the apex about two-thirds of the breadth of the apex of the second segment. Pygidial area very narrow. Hind tibiæ serrate.

Hab. Api, New Hebrides; May (*W. W. Froggatt*).